US LHC Accelerator Research Program
Task Sheet

Task Name: Tune Feedback **Date:** 5 Sep 06
Responsible Person: Peter Cameron
Authorized Budget: BNL $255K, FNAL $55K

Statement of work for FY07 (include description of year's "deliverables" and, if appropriate one or a few intermediate milestones)**:**

BNL deliverables: (12 man-months)

1. Continued support of VME-based Baseband Tune (VME BBQ) (1 mm):
2. Final Design Review - October 2006 (0.5 mm)
3. DAB-based Baseband Tune (DAB BBQ) for RHIC Run 7 (6 mm):
    a. Familiarization with CERN-supplied hardware and software (2 mm)
    b. Complete the installation and system integration (2 mm)
    c. Development of ADOs and GUIs (1 mm)
    d. Operation with beam (1 mm)
4. Studies and beam experiments at RHIC with RHIC PLL/TF systems configured as appropriate to gain information beneficial to LHC TF, primarily for chromaticity feedback (2 mm)
5. DAB BBQ for LHC commissioning (assuming first beam early in FY08) (2 mm)
    a. Development work on final gate array code
    b. Participation in system integration and testing
6. Attend meetings, generate reports,… (0.5 mm)

FNAL deliverables: (2.4 man-months)

1. studies of chromaticity measurement methods
2. modeling of VME-based and DAB-based BBQ systems

MSTC Budget Breakdown:		**K$**	
BNL labor – 1.0 FTE		200	
BNL materials		25	
BNL travel		30	
	BNL total		255
FNAL labor – 0.2 FTE		40	
FNAL materials		5	
FNAL travel		10	
	FNAL total		55
	total	**310**	

BNL Personnel and tasks:
Peter Cameron (overall responsibility, operations, programming), Chris Degen (LabVIEW programming), Al DellaPenna (hardware, operations, FPGA programming), Larry Hoff (DAB driver, ADO programming), Al Marusic (ADO programming), Joe Mead (FPGA code), Jack Fried (FPGA code) and Carl Schultheiss (magnet control).

FNAL Personnel and tasks:
C.Y.Tan will be responsible for the FNAL effort.

CERN liasons:
Rhodri Jones, Hermann Schmickler, Marek Gasior, Ralph Steinhagen

Statement of expected follow-on work in subsequent years (include "ultimate" goal and time scale for this sub-program, as well as plans for specific work and rough budget need for next 2 years)**:**

BNL follow-on work:

1. delivery of final LHC 4-channel DAB BBQ to CERN
    a. Written report documenting the evaluation and optimization of DAB BBQ functioning in RHIC (loop bandwidths, operationally useful PID parameters, magnet control filter parameters, emittance growth as a function of kicker excitation,…)
    b. Written report documenting the utilization of BBQ in tune, coupling, and chromaticity correction and feedback in RHIC Runs 6 and 7.
    c. Written report documenting the utilization of BBQ in RHIC beam experiments relevant to the LHC (beam-beam, electron cloud, correction of IR non-linearities, instabilities,…)
    d. Specific studies as needed in the areas of multi-carrier PLL, synchrotron satellites, damper noise floor, dynamic range, autoexcitation,…
    e. Collaboration on DAB FPGA programming of PLL code
2. support of pre-beam DAB BBQ system integration and commissioning at CERN
3. support of with-beam DAB BBQ system commissioning at CERN
4. travel to support the above efforts

FNAL follow-on work: TBD

Ultimate goal of these efforts: Tune feedback in LHC, time scale to extend 2 years beyond initial beam in LHC.